

CLAIMS:

1. A chemical-mechanical polishing composition, comprising:
an aqueous solution; and
an abrasive comprising polymeric particles having an electrical charge sufficient to create an electrostatic repulsive force between proximate particles.
2. The composition of claim 1, wherein the particles comprise a material selected from a group consisting of a polyacrylate, a polyvinyl alcohol, a polyvinyl benzene, a polyvinylidene chloride, a polymelamine, a polypropylene, a polyethylene, a polystyrene, a polyester, a polyamide, a polyurethane, and any combination thereof.
3. The composition of claim 1, wherein the particles comprise a material selected from polymethyl methacrylate and polybutyl methacrylate.
4. The composition of claim 1, wherein the particles have a functionality selected from a group consisting of hydrophilicity and hydrophobicity.
5. The composition of claim 1, wherein an average diameter of the particles is from about 0.1 to about 1.8 microns.
6. The composition of claim 1, further comprising an oxidizing agent.
7. The composition of claim 1, further comprising an oxidizing agent selected from a group consisting of hydroxylamine, a salt of hydroxylamine, hydrogen peroxide, periodic acid, a peracetic acid, ammonium persulfate, and any combination thereof.
8. The composition of claim 1, further comprising an oxidizing agent that comprises hydroxylamine nitrate.

9. The composition of claim 7, further comprising a secondary oxidizing agent selected from a group consisting of a salt of iron, copper, or cesium, a chelated complex of any such salt, nitric acid, and any combination thereof.

10. The composition of claim 1, wherein the composition has a zeta potential of from about -60 mV to about 10 mV.

11. The composition of claim 1, wherein the composition has a zeta potential of from about -60 mV to about 5 mV.

12. The composition of claim 1, wherein the composition has a pH of from about 4 to about 8.

13. The composition of claim 1, wherein the composition has a pH of from about 5 to about 7.

14. The composition of claim 1, wherein the aqueous solution comprises ionic species.

15. A chemical-mechanical polishing composition, comprising:
an aqueous solution;
an abrasive comprising polymeric particles selected from a group consisting of a polyacrylate, a polyvinyl alcohol, a polyvinyl benzene, a polyvinylidene chloride, a polymelamine, a polypropylene, a polyethylene, a polystyrene, a polyester, a polyamide, a polyurethane, and any combination thereof, the particles having an electrical charge sufficient to create an electrostatic repulsive force between adjacent particles; and
an oxidizing agent selected from a group consisting of hydroxylamine, a salt of hydroxylamine, hydrogen peroxide, periodic acid, a peracetic acid, ammonium persulfate, and any combination thereof.

16. The composition of claim 15, wherein the particles comprise a material selected from polymethyl methacrylate and polybutyl methacrylate.

17. The composition of claim 15, wherein the particles have a functionality selected from a group consisting of hydrophilicity and hydrophobicity.

18. The composition of claim 15, wherein an average diameter of the particles is from about 0.1 to about 1.8 microns.

19. The composition of claim 15, wherein the oxidizing agent comprises hydroxylamine nitrate.

20. The composition of claim 15, further comprising a secondary oxidizing agent selected from a group consisting of a salt of iron, copper, or cesium, a chelated complex of any such salt, nitric acid, and any combination thereof.

21. The composition of claim 15, wherein the composition has a zeta potential of from about -60 mV to about 10 mV.

22. The composition of claim 15, wherein the composition has a zeta potential of from about -50 mV to about 5 mV.

23. The composition of claim 15, wherein the composition has a pH of from about 4 to about 8.

24. The composition of claim 15, wherein the composition has a pH of from about 5 to about 7.

25. The composition of claim 15, wherein the aqueous solution comprises ionic species.

26. A method of polishing a substrate surface using a polishing pad, comprising:

providing the composition of any of claims 1, 6, and 15, on the surface; and
causing relative motion between the surface and the polishing pad.

27. The method of claim 26, wherein the surface comprises a feature of a material selected from a group consisting of aluminum, copper, silver, tungsten, any alloy of thereof, and any combination thereof.

28. A method of preparing a composition for chemical-mechanical polishing, comprising:

providing an aqueous solution;
imparting an electrostatic charge to polymeric particles, the electrical charge sufficient to create an electrostatic repulsive force between proximate particles; and
adding an abrasive comprising the electrostatically charged polymeric particles to the aqueous solution.

29. A method of preparing a composition for chemical-mechanical polishing, comprising:

providing an aqueous solution;
imparting an electrostatic charge to polymeric particles, the electrical charge sufficient to create an electrostatic repulsive force between proximate particles;
adding an abrasive comprising the electrostatically charged polymeric particles to the aqueous solution; and
adding an oxidizing agent to the aqueous solution.

30. The method of claim 28 or 29, further comprising adjusting a pH of the composition.

31. A composition for chemical-mechanical polishing produced according a method of claim 28 or 29.